

**EPA**United States Environmental Protection Agency  
Washington, DC 20460**Work Assignment**

Work Assignment Number

0-52



Other



Amendment Number:

Contract Number

ep-c-09-027

Contract Period

4/1/09 - 3/31/10

Base

X

Option Period Number

Title of Work Assignment/SF Site Name

Determination of Emission Factors for

Contractor

Arcadis US

Specify Section and Paragraph of Contract SOW

1.1-1.5, 1.8, 2.0, 4.0, 5.0, 7.0

Purpose:



Work Assignment



Work Assignment Close-Out



Work Assignment Amendment



Incremental Funding



Work Plan Approval

Period of Performance

From 12/9/09 To 03/31/10

Comments:

Determination of Emission Factors from Open Burning + Open  
Detonation of Military Ordnance  
See attached SOW.



Superfund

## Accounting and Appropriations Data



Non-Superfund

Note: To report additional accounting and appropriations data use EPA Form 1800-68A.

SFO

(Max 2)

22

Line	DCN (Max 6)	Budget/FY (Max 4)	Appropriation Code (Max 6)	Budget Org/Code (Max 7)	Program Element (Max 9)	Object Class (Max 4)	Amount (Dollars)	(Cents)	Site/Project (Max 8)	Cost Org/Code (Max 7)
1										
2										
3										
4										
5										

## Authorized Work Assignment Ceiling

Contract Period:

Cost/Fee:

LOE:

This Action:

1492

Total:

1492

## Work Plan / Cost Estimate Approvals

Contractor WP Dated:

Cost/Fee:

LOE:

Cumulative Approved:

Cost/Fee:

LOE:

Work Assignment Manager Name

Brian Gullett

(Signature)

11/10/2009

(Date)

Branch/Mail Code:

Phone Number:

FAX Number:

Project Officer Name

Diane L. Pierce

(Signature)

12/13/09

(Date)

Branch/Mail Code:

Phone Number:

919-541-2708

FAX Number:

Other Agency Official Name

Frank Princiotti

(Signature)

12-2-09

(Date)

Branch/Mail Code:

Phone Number:

919-541-3444

FAX Number:

Contracting Official Name

Renita Tyas

(Signature)

12/9/09

(Date)

Branch/Mail Code:

Phone Number:

573-487-2094

FAX Number:

## **Work Assignment 0-52**

### **Statement of Work**

#### **Determination of Emission Factors from Open Burning and Open Detonation of Military Ordnance**

##### **I. BACKGROUND**

U.S. Department of Defense (DOD) Installations, especially demilitarization facilities and Army Ammunition Plants (AAPs), have used Open Burning/Open Detonation (OB/OD) for a long time as a safe and economic means to dispose of propellants, explosives, and munitions. DOD installations are required to comply with the Resource Conservation and Recovery Act (RCRA) to operate OB/OD facilities. RCRA permits provide annual limits on the amount of energetic materials that can be disposed of at OB/OD facilities. The permit limitations are based on human health risk assessments that include risk estimates from airborne exposure to pollutants generated from OB/OD. These assessments use emission factors developed mostly from a limited number of tests on small scale OB/OD chambers, known as a "bang box." Emission factors developed from bang box tests have been challenged because of the potential differences between real world field situations and bang box test results. Some RCRA permit holders consider the permit conditions to be overly stringent because bang box data are too conservative and incomplete.

##### **II. PURPOSE**

The objectives of this project are to develop and apply methods for sampling OB/OD events in the field to characterize gaseous and particulate matter (PM) air emissions for the determination of emission factors.

The project, funded by an Intergovernmental Agreement (IA) with the Strategic Environmental Research and Development Program (SERDP) will provide essential information on recommended methodology for future experimental determinations / verifications of emission factors and will nominate emission factors for these processes.

##### **Background Information and Special Instructions**

- Results from this project will assist DOD in characterizing emissions from military OB/OD; determine the validity of past OB/OD emission factor work, especially "Bang Box" simulation data; enhance the database of OB/OD information; and develop a firm scientific basis to comply with environmental regulations while proactively protecting human health and the environment.
- The Contractor is expected to use government furnished equipment (GFE) for the work. This shall include aerial sampling equipment, ground-based sampling equipment, the organic support analytical laboratory equipment, and related support equipment.
- Facility operating manuals for the above-mentioned devices shall be followed. Analytical methods and sampling procedures shall follow EPA protocols where practical and

applicable.

- If sufficient funds are deemed available by the WAM and CO, the contractor shall send qualified personnel to at least one nationally-known conference for presentation of related results.
- The Contractor is advised that the output of this programmatic effort will be reports to the DoD as well as scholarly, peer-review journal publications.
- It is the intention of this program to provide the scientific community, the DoD, and the EPA regulatory community with information regarding these pollutants that shall enable sound, scientific decisions to be made regarding emissions and risks from OB/OD.

### III. STATEMENT OF WORK

(1). The contractor shall develop a quality assurance plan for sampling OB/OD events at the Tooele, Utah, Army Ammunition Center. Sampling will be via an aerial, balloon-borne instrument pack developed by EPA ("the Flyer"). Additional sampling may be by tower-based, high-volume samplers, at the discretion of the WAM. Target analytes will be selected by the WAM from the list of analytes sampled at previous Bang Box tests and supplemented by analytes nominated by others for risk concerns.

Testing will be done at the Army's Tooele Test Range in Tooele, Utah.

Open Burn (OB) events will use will M1 Propellant.

Open Detonation events will use flake trinitrotoluene (TNT).

(2) In preparation for the Tooele test, the Contractor shall conduct trials of the aerial sampling methods, at the discretion of the WAM, to validate the performance of the instruments.

(3) In preparation for the Tooele test, the Contractor shall develop analytical detection limits for the target analytes.

(4) The Contractors shall participate in the Tooele sampling campaign, at the discretion of the WAM, by deploying the sampling equipment over the (anticipated) 10-12 day campaign.

Additional instructions shall be conveyed in writing by the WAM in accordance with the "Technical Direction" clause. Remote, or field, testing may be required, at the technical direction of the WAM.

#### Reporting.

The Contractor shall ensure that all reporting requirements as specified by the Contract

are met.

Quality Assurance.

The Contractor shall adhere to and ensure that all applicable QA/QC and safety and health rules and requirements are met. Since this work covers both development/adaptation of sampling methods to new, unsampled sources and measurement to determine emission factors, the contractor shall develop quality assurance documentation as required for both Method Development projects and Measurement Projects (see Attachment #1 and #2) to this Statement of Work. Work involving environmental data shall not commence until the quality assurance documentation has received official approval from the EPA Quality Assurance Staff.

Additional

Additional instructions will be conveyed in writing by the WAM in accordance with the "Technical Direction" clause.

#### IV. DELIVERABLES AND SCHEDULE

##### Deliverables

1. Weekly Meetings and E-Mail Reports: The WAM and contractor's project manager shall hold biweekly project meetings to discuss Task-specific progress, issues, and action items. The contractor project manager shall send an e-mail report to the WAM within one business day of this meeting, unless otherwise specified by the WAM. The e-mail report shall:

- Specify work goals and priorities for each Task under this work assignment;
- Document action item issues planned in the last weekly meeting for each Task;
- Specify the status of outstanding Task-specific test plans, QA plans, and safety plans;

and

- Itemize issues and concerns that need resolution for each Task.

2. Monthly Task Progress and Cost Reports: The contractor's monthly report to EPA shall summarize work activities (accomplished and planned) for each Task in this work assignment, including the status of applicable test, QA, and safety plans. The monthly report shall also detail labor costs and ODC charges.

3. Health and Safety Protocols: Health and safety protocols for each Task shall be updated or prepared as required by the EPA ERC and APPCD safety personnel. These protocols shall be approved by the WAM and safety personnel prior to the conduct of any testing.

4. Quality Assurance Project Plan (QA/QC) and Test Plans: The contractor shall perform the activities described in these Tasks with reference to the QAPPs entitled

- U.S. EPA Evaluation of Dioxin Emissions Pre-testing Phase,
- Burning CCA-Treated Wood in the Open Burn Test Facility (OBTF),
- Development of analysis methods for the study of PCDD/F TEQ indicators, and

- Evaluation of Dioxin-Like Emissions from Residential Wood Combustion.

5. Facility Manual(s): Relevant manuals shall be reviewed, updated, and approved as specified in QA requirements for facility manuals provided by the EPA QA office.

6. RCRA Compliance reports for activities conducted in the RCRA and Air permitted facility (as relevant): These reports shall be provided to the WAM and EPA personnel responsible for the permitted facility, upon request.

## V. MILESTONES

The following milestones are identified:

- 20 days after WA receipt. The Contractor shall prepare a Work Plan and deliver to the PO and WAM.
- 20 days after WA receipt. The Contractor shall prepare a draft QA plan and any relevant H&S protocols and facility manuals/operating procedures. Updated plans shall be delivered to the WAM.
- February 12, 2010. The Contractor shall complete all analyte methods and detection limit determinations in the laboratory.
- March 31, 2010. The Contractor shall conduct field sampling at Tooele, Utah of open burning and open detonation of military ordnance at the discretion of the WAM. The date is approximate and is dependent on site-specific factors.

## **ATTACHMENT #1 TO THE STATEMENT OF WORK (SOW) FOR MEASUREMENT & METHOD DEVELOPMENT PROJECTS**

### **NRMRL Quality Assurance (QA) Requirements**

In accordance with EPA Order 5360.1 A2, conformance to ANSI/ASQC E4 must be demonstrated by submitting the quality documentation specified herein. All quality documentation shall be submitted to the Government for review. The Government will review and return the quality documentation, with comments, and indicate approval or disapproval. If the quality documentation is not approved, it must be revised to address all comments and shall be resubmitted to the Government for approval. Work involving environmental data collection, generation, use, or reporting shall not commence until the Government has approved the quality documentation. The quality documentation shall be submitted to the Government at least thirty (30) days prior to the beginning of any environmental data gathering or generation activity in order to allow sufficient time for review and revisions to be completed. After the Government has approved the quality documentation, the Contractor shall also implement it as written and approved by the Government. Any EPA-funded project/program may be subject to a QA audit.

#### **TO BE SUBMITTED PRE-AWARD (mark all that apply):**

☐ **NRMRL's Quality System Specifications:**

- (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
- (2) an organizational chart showing the position of the QA function;
- (3) delineation of the authority and responsibilities of the QA function;
- (4) the background and experience of the QA personnel who will be assigned to the project; and
- (5) the organization's general approach for accomplishing the QA specifications in the SOW.

- ☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,  
<http://www.epa.gov/quality/qs-docs/r2-final.pdf>

#### **TO BE SUBMITTED POST-AWARD (mark all that apply):**

☐ **NRMRL's Quality System Specifications:**

- (1) a description of the organization's Quality System (QS) and information regarding how this QS is documented, communicated and implemented;
- (2) an organizational chart showing the position of the QA function; 07/14/08 A-2
- (3) delineation of the authority and responsibilities of the QA function;
- (4) the background and experience of the QA personnel who will be assigned to the project; and
- (5) the organization's general approach for accomplishing the QA specifications in the SOW.

- ☐ **Quality Management Plan:** prepared in accordance with R-2 - EPA Requirements for Quality Management Plans (EPA/240/B-01/002) March, 2001,  
<http://www.epa.gov/quality/qs-docs/r2-final.pdf>

- ☐ **Category I or II Quality Assurance Project Plan (QAPP):** prepared in accordance with R-5 - EPA Requirements for QA Project Plans (EPA/240/B-01/003) March, 2001  
<http://www.epa.gov/quality/qs-docs/r5-final.pdf>

- ☒ **Category III or IV QAPP:** prepared in accordance with applicable sections of the following NRMRL QAPP Requirements List(s) which is(are) included in this attachment:

**X QAPP Requirements for Measurement Projects**

- ☐ QAPP Requirements for Secondary Data Projects
- ☐ QAPP Requirements for Research Model Development and/or Application Projects
- ☐ QAPP Requirements for Software Development Projects

**X QAPP Requirements for Method Development Projects**

- ☐ QAPP Requirements for Design, Construction, and/or Operation of Environmental Technology Projects

**ADDITIONAL QA RESOURCES:**

EPA's Quality System Website: <http://www.epa.gov/quality/>

EPA's Requirements and Guidance Documents: [http://www.epa.gov/quality/qa\\_docs.html](http://www.epa.gov/quality/qa_docs.html)

---

**NRMRL QAPP REQUIREMENTS FOR MEASUREMENT PROJECTS**

**GENERAL REQUIREMENTS:**

Include cover page, distribution list, approvals, and page numbers.

**0. COVER PAGE**

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

**1. PROJECT DESCRIPTION AND OBJECTIVES**

- 1.1 Describe the process and/or environmental system to be evaluated.
- 1.2 State the purpose of the project and list specific project objective(s).

**2. ORGANIZATION AND RESPONSIBILITIES**

- 2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
- 2.2 Include a project schedule that includes key milestones.

**3. SCIENTIFIC APPROACH**

- 3.1 Describe the sampling and/or experimental design that will be used to generate the data needed to evaluate the projective objective(s). A description of the design should include the types and numbers of samples (including QC and reserve samples), the design of the sampling network, sample locations and frequencies, and the rationale for the design.
- 3.2 Identify the process measurements (e.g., flow rate, temperature) and specific target analyte(s) for each sample type.
- 3.3 Describe the general approach and the test conditions for each experimental phase.

**4. SAMPLING PROCEDURES**

- 4.1 Describe any known site-specific factors that may affect sampling procedures as well as all site preparation (e.g., sampling device installation, sampling port modifications, achievement of steady-state) needed prior to sampling.
- 4.2 Describe or reference each sampling procedure (including a list of equipment needed and the calibration of this equipment as appropriate) to be used. Include procedures for homogenizing, compositing, or splitting of samples, as applicable.
- 4.3 Provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis.
- 4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
- 4.5 Describe the method for uniquely numbering each sample.
- 4.6 Describe procedures for packing and shipping samples, including procedures to avoid cross-contamination, and provisions for maintaining chain-of-custody (e.g., custody seals and records), as applicable.

## **5 MEASUREMENT PROCEDURES**

- 5.1 Describe in detail or reference each process measurement or analytical method to be used. If applicable, identify modifications to EPA-approved or similarly validated methods.
- 5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

## **6 QUALITY METRICS (QA/QC CHECKS)**

- 6.1 For each process measurement and analytical method, identify the required QC checks (e.g., blanks, control samples, duplicates, matrix spikes, surrogates), the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.
- 6.2 Any additional project-specific QA objectives (e.g., completeness, mass balance) shall be presented, including acceptance criteria.

## **7 DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT**

- 7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
- 7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
- 7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
  - 7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
  - 7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
- 7.4 Describe data storage requirements for both hard copy and electronic data.

## **8 REPORTING**

- 8.1 List and describe the deliverables expected from each project participant responsible for field and/or analytical activities.
- 8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report).

## **9. REFERENCES**

Provide references either in the body of the text as footnotes or in a separate section.



# Attachment 2

## **NRMRL QAPP REQUIREMENTS FOR METHOD DEVELOPMENT PROJECTS**

### **GENERAL REQUIREMENTS:**

Include cover page, distribution list, approvals, and page numbers.

### **0. COVER PAGE**

Include the Division/Branch, project title, revision number, EPA technical lead, QA category, organization responsible for QAPP preparation, and date.

### **1. PROJECT DESCRIPTION AND OBJECTIVES**

- 1.1 Provide a description of the situation that requires the generation of a new or modified method.
- 1.2 State the purpose of the project and list specific project objective(s).

### **2. ORGANIZATION AND RESPONSIBILITIES**

- 2.1 Identify all project personnel, including QA, and related responsibilities for each participating organization, as well as their relationship to other project participants.
- 2.2 Include a project schedule that includes key milestones.

### **3. SCIENTIFIC APPROACH**

- 3.1 Identify the specific analyte(s) of interest and the matrix/matrices under study.
- 3.2 Identify the analytical approach that will be used and how it will be optimized for this study. Also describe any tests of interference and analyte stability.
- 3.2 Identify the method performance metrics (QA/QC checks) that will be used to evaluate the method, including the procedures used. These metrics could include (but are not limited to) positive and negative controls, sensitivity, precision, accuracy, recovery, linearity, specificity, robustness, and range.

### **4. SAMPLING PROCEDURES**

- 4.1 Provide the requirements for samples that will be used to test the method (including matrix and presence/concentration of analytes).
- 4.2 If synthetic (i.e., laboratory-prepared) samples are used, describe the preparation of these samples.
- 4.3 If non-synthetic (i.e., real-world sample) samples are used, address the following:
  - describe the sampling design that will be used and the steps taken to assure that representative samples are collected
  - discuss or reference each sampling procedure
  - provide a list of sample containers, sample quantities to be collected, and the sample amount required for each analysis, including QC sample analysis
  - describe procedures for packing and shipping samples, and provisions for maintaining chain-of-custody, as applicable
- 4.4 Specify sample preservation requirements (e.g., refrigeration, acidification, etc.) and holding times.
- 4.5 Describe the method for uniquely numbering each sample.

### **5. MEASUREMENT PROCEDURES**

- 5.1 Describe in detail or reference each preparation or analytical procedure to be used, if known. Include steps for preparation, calibration, measurement, quality control, and reporting.

5.2 If not provided in Section 5.1 or the referenced method, include specific calibration procedures, including linearity checks and initial and continuing calibration checks.

## **6. METHOD PERFORMANCE METRICS**

For each method performance metric (QA/QC check) identified in Section 3.2, specify the frequencies for performing these checks, associated acceptance criteria, and corrective actions to be performed if acceptance criteria are not met.

## **7. DATA ANALYSIS, INTERPRETATION, AND MANAGEMENT**

- 7.1 Identify the data reporting requirements, including data reduction procedures specific to the project and applicable calculations and equations.
- 7.2 Describe data validation procedures used to ensure the reporting of accurate project data.
- 7.3 Describe how the data will be summarized or analyzed (e.g., qualitative analysis, descriptive or inferential statistics) to meet the project objective(s).
  - 7.3.1- If descriptive statistics are proposed, state what tables, plots, and/or statistics (e.g., mean, median, standard error, minimum and maximum values) will be used to summarize the data.
  - 7.3.2- If an inferential method is proposed, indicate whether the method will be a hypothesis test, confidence interval, or confidence limit and describe how the method will be performed.
- 7.4 Describe data storage requirements for both hard copy and electronic data.

## **8. REPORTING**

- 8.1 List and describe the deliverables expected from each project participant.
- 8.2 Specify the expected final product(s) that will be prepared for the project (e.g., journal article, final report, etc.). If a method/SOP will be developed, specify the required format.

## **9. REFERENCES**

Provide references either in the body of the text as footnotes or in a separate section.